

Prevalence of obesity and physical activity among primary school children in Erbil City/Iraq

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Abstract

Background: As inactive lifestyles and a tendency for having a more comfortable life rise in the Iraqi population, obesity prevalence has become a major public health concern particularly among children in the Kurdistan Region Iraq. Moreover, obesity can result in an enormous burden to the economy and public health. Conducting educational programs of physical activity and modifying nutrition patterns among primary school children can be a preventive strategy. The present study was aimed at identifying the obesity prevalence rate and its risk factors among primary school children in Erbil, the Kurdistan Region of Iraq.

Patients and methods: In a cross-sectional descriptive study, 400 children who were 6 to 13 years old were selected from primary schools in Erbil and studied from 2017 to 2019. A researcher-designed questionnaire was employed to gather required socioeconomic and sociodemographic data. For this purpose, face-to-face interviews were carried out with the children's parents. Moreover, the UNICEF calibrated digital scale was used to measure the children's weight, a portable stadiometer for their height, and their height and weight for their body mass index. Statistical Package for the Social Sciences (version 22) was used to analyze the collected data.

Results: It was seen that 26% of the students were obese. All age groups and grades had an almost equal prevalence of obesity. Obesity was more prevalent among those students who were males, had child ranking of 1st or 2nd, whose parents lived together, whose parental education was illiterate or primary, whose mother was retired, and whose father was retired. Having an obese mother or father, eating more than 3 main meals per day, physical inactivity, and low socioeconomic status was found to be effective factors in causing children's obesity. There was a significant relationship between children's daily physical activity and nutritional status ($p=0.000$).

Conclusion: Obesity prevalence was higher among inactive primary school children who had an obese mother or father, ate more than 3 main meals per day and had low socioeconomic status. Daily physical activity of children was directly associated with a decrease in obesity prevalence in children.

Keywords: childhood obesity, physical activity, primary school students, daily meals

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Introduction

As supported by enormous evidence, physical activity has remarkable health benefits for children and adolescents [1,2]. However, global statistics indicate that the level of physical activity in younger populations is significantly low, and both developed and developing countries refer to physical inactivity prevalence as a major public health concern [3-5]. There is also data showing that there is an increase in sedentary behavior levels and obesity prevalence [6]. Global statistics also show that about 80% of adolescents aged 13 to 15 years do not meet the recommended guidelines as they spend less than 60 minutes of their daily time doing moderate-vigorous physical activity (MVPA) [7]. Similar to other developing countries, the Kurdistan region of Iraq is witnessing the development of major health risk factors in its younger populations [8]. According to the results of a study of childhood obesity prevalence among primary school children in Erbil city, obesity and overweight prevalence among the study sample was 1.6% and 9.3%, respectively [9]. Sherzad also investigated overweight/obesity prevalence and the associated factors, and the results revealed that the overall prevalence of obesity and overweight was 74.3% [8].

Moreover, it has been indicated that being overweight/obese is significantly associated with physical inactivity, low educational level, and older age groups of children [8]. In addition, as indicated by the results of a large-population school-based survey on the physical activity and fitness in China in 2016, the recommended guidelines of 60 minutes of daily MVPA were not met by about 70% of the school-aged children and adolescents as their average daily MVPA was 45 minutes [11]. Another study in China showed that the Chinese national physical fitness “excellent” standards were not met by 94% of the students, and 12% were found to be obese according to their body mass index (BMI) percentile scores [12]. Research has also indicated that boys and girls, adolescents and young children, and children and adolescents living in rural communities and those living in urban communities have several differences with regard to the health outcomes of physical activities [13]. As a result, demographic characteristics can be considered as significant associated factors.

It has been stated that the health goal is to make school-aged children achieve at least 1 hour of physical activity every day and help over 25% of them achieve an excellent rating in fitness [14]. However, significant barriers and challenges exist in making progress towards meeting these goals of public health. Some other public health goals are a steady prevalence of physical inactivity in young populations, a constant decrease trend in obesity, an overemphasis on academic excellence, cultural-specific and age-appropriate physical activities, and/or provision of intervention guidelines for school-aged children and adolescents [15, 16]. Such issues have caused the public health surveillance of the Kurdistan Region of Iraq physical activity and other health outcomes to be considered as a high priority, and dealing with these issues is a necessary step towards creating baseline data to inform health promotion strategies and policies [8]. In this regard, the main objective of this study was to provide an update on the population prevalence estimates of physical activity and identifying the obesity prevalence rate and its risk factors among primary school children in Erbil, the Kurdistan Region of Iraq.

Methods and materials

Study design and setting

The current study was carried out using a descriptive cross-sectional design. It was aimed at evaluating food behavior and nutritional status among primary school children in Erbil City, the Kurdistan region of Iraq. The study period was from October 1, 2017, to August 1, 2019.

Study sample

A multi-stage approach, including cluster, stratified, and simple random sampling was employed to select 400 primary school students from among a target population of 6,614 students. In so doing, based on Erbil Municipalities, six geographical sectors in Erbil city were determined. Afterward, a randomized sampling method was used to choose two primary schools in each sector. Finally, using stratified sampling, grades one to six of primary schools were selected, and to pull near 5% from each school strata, a simple random sampling was employed, which led to the selection of 400 students.

Data collection

A researcher-designed questionnaire was used to collect the required data. It consisted of two sections. The first section included items regarding the children and their parents' demographic characteristics, while the second section related to weekly child's physical activities which are included with 19 dichotomous questions with yes or no responds and 6 multiple-choice questions. The of the families were measured through another questionnaire which provided data on the parents' educational level, number of family members, crowding index, type of house and properties. The socioeconomic status scores of 70-100 were labeled as high, 40-69 as moderate, and 10-39 as low. Face-to-face interviews were conducted with the children's parents at their home in order to complete the questionnaires.

A UNICEF calibrated digital scale (UNICEF electronic scale Seca 890) was used to measure the children's weight to the nearest 0.1 kilograms while the children were wearing light clothes and no shoes. Also, a portable stadiometer (Seca 208 body meter, secavogel and GmbH, and Co, Hamburg, Germany) was employed to measure their height to the nearest centimeter while the children were asked to stand without wearing any shoes. Moreover, the following equation was used to calculate their body mass index:

$$\text{BMI} = \text{weight (kg)} / [\text{height (m)}]^2$$

In addition, an international standardized chart according to gender-specific BMI form CDC 2-20 years were used to determine their BMI. For this purpose, the following table was used to determine their weight status.

Table 1. Weight status category percentile range

Underweight	BMI < 5th percentile
Healthy weight	BMI for age \geq 5 and <85 percentile
Overweight	BMI for age \geq 85 and < 95th percentile
Obese	BMI \geq 95th percentile

To examine the validity of the questionnaire, it was given to 10 experts who had experience in the field, and the final draft of the questionnaire was revised based on their views. Moreover, a pilot study was conducted to check its reliability. For this purpose, a randomly chosen sample of 30 primary school children was used, which revealed its reliability to be $r=0.790$.

Data analysis

Statistical Package for the Social Sciences (version 22) was used for data analysis. The association between the children’s socio-demographic status and nutritional status was also determined. Moreover, the relationship between their nutritional status and food behavior was examined by using regression.

Ethical consideration

Required approval was obtained from the College of Nursing, Hawler Medical University, the Kurdistan Region of Iraq. In addition, the Directorate of Education in Erbil gave necessary approval. Moreover, each parent announced his/her informed consent.

Results

According to the results, obesity was observed in all groups with somewhat close percentages. However, the highest percentage rate of obesity belonged to the age group 12-<13 years old (31.66%). It was also seen that obesity was more prevalent among male students ($n=60$) than the females ($n=44$). It was also found that all grades suffered from obesity almost equally, with the highest rate belonging to the 6th grade with a percentage of 33.3%. Children who were the 1st or 2nd child in their families had the highest rate of obesity with 32.3%. The results showed that obesity was more prevalent among children whose father got married more than once, followed by those whose parents were living together. Obesity was more prevalent among children whose mother illiterate and whose father had a primary level of education. Children whose parents were a retired had the highest prevalence of obesity (See Table 2).

Table 2. Distribution of socio-demographic data of primary school children (n=400)

Variables		Nutritional status of primary school children				Total
		Underweight	Normal weight	Overweight	Obese	
Child age	6-<7 years	2	20	11	9	42
	7-<8 years	6	29	9	17	61
	8-<9 years	2	31	4	12	49
	9-<10 years	4	25	9	15	53
	10-<11 years	5	23	16	16	60
	11-<12 years	4	28	13	13	58
	12-<13 years	4	27	10	19	60

	13 years old	0	6	8	3	17
Gender	Male	5	92	49	60	206
	Female	22	97	31	44	194
Grade	1 st class	4	27	14	16	61
	2 nd class	6	37	8	15	66
	3 rd class	2	36	8	18	64
	4 th class	5	30	15	20	70
	5 th class	8	32	22	14	76
	6 th class	2	27	13	21	63
Child ranking	1 st – 2 nd	2	59	27	42	130
	3 rd – 4 th	13	83	24	37	157
	5 th – 6 th	11	40	25	23	99
	7 th – 8 th	1	7	4	2	14
Parents' marital status	Together	25	178	76	89	368
	Mother died	0	0	1	1	2
	Father died	2	7	1	4	14
	Divorced	0	2	0	0	2
	Father married more than once	0	2	2	10	14
Mother's educational level	Illiterate	0	1	4	4	9
	Read and Write	1	3	9	9	22
	Primary	8	35	16	26	85
	Intermediate	7	28	14	26	75
	Secondary	4	17	6	6	33
	Institute	4	52	14	12	82
	University	3	53	17	21	94
Father's educational level	Illiterate	0	1	1	0	2
	Read and Write	0	3	5	0	8
	Primary	1	11	12	25	49
	Intermediate	3	28	11	17	59
	Secondary	8	29	11	19	67
	Institute	4	35	10	10	59
	University	11	82	30	33	156
Mother's employment	government employee	6	71	14	26	117
	Non-governmental employee	0	9	5	2	16
	Not employee	21	109	60	74	264
	Dead	0	0	1	1	2
	Retired	0	0	0	1	1
Father's employment	Governmental employee	10	60	23	25	118
	Non-governmental employee	15	121	55	72	263
	Not employee	0	0	1	0	1
	Dead	2	7	1	4	14
	Retired	0	1	0	3	4

Regarding the student's weight status, it was seen that out of the 400 studied children, 104 (26%) were obese and 80 (20%) were overweight (See Table 3).

Table 3. Distribution of weight status for primary school students

Students' nutritional status	No.	%
Underweight	27	6.8
Normal weight	189	47.3
Overweight	80	20
Obese	104	26
Total	400	100%

The data collected on the students' family history of obesity indicated that the highest prevalence of obesity belonged to those children whose mother or father was obese (See Table 4).

Table 4. Distribution of weight status of children with their family history of obesity

Family history	Nutritional status of primary school children				Total
	Underweight	Normal weight	Overweight	Obese	
Father	1	9	2	13	25
Mother	2	15	12	31	60
Brother	3	15	8	7	33
Sister	0	11	10	11	32
Other	0	4	2	2	8
Nobody	21	130	43	35	229
Father + (brother or sister)	0	3	2	3	8
Mother + (brother or sister)	0	2	1	2	5
Total	27	189	80	104	400

The results of the study revealed that there was a highly significant association between the occurrence of obesity and the number of the main meals eaten by the children (p-value=0.000), such that obesity was more prevalent among those students who ate more than 3 main meals per day, followed by those who ate 3 times a day (See Table 5).

Table 5. The association between obesity occurrence and the number of main meals per day

Main meals	Nutritional status of primary school children				Total
	Underweight	Normal weight	Overweight	Obese	
2 times/day	9	22	15	17	63
3 times/day	17	142	44	57	260
More than 3 times/day	1	25	21	30	77
Total	27	189	80	104	400
df = 6	Chi square= 27.665			P. value=0.000	

It was also observed that obesity was more prevalent among inactive students compared to active ones with 80 students (35%), while only 24 active students were obese (See Table 6).

Table 6. Prevalence of obesity according to the children’s physical activity

Physical activity	Nutritional status of primary school children				Total
	Underweight	Normal weight	Over Weight	Obese	
Inactive person	13	71	65	80	229
Active person	14	118	15	24	171
Total	27	189	80	104	400

The results also indicated that there was a highly significant association between the children’s daily activity and their nutritional status (p-value=0.000) (See Table 7).

Table 7. Relationship between daily physical activity and their nutritional status

Model	Unstandardized coefficients		Standardized coefficients	t	Sig
	B	Std. Error	Beta		
Daily activity	-0.639	0.090	-0.337	-7.135	0.000

Moreover, as revealed by the results of the study, the obesity rate was remarkably higher among children whose families had a low socioeconomic status, such that 44 out of 104 students were obese (see Figure 1).

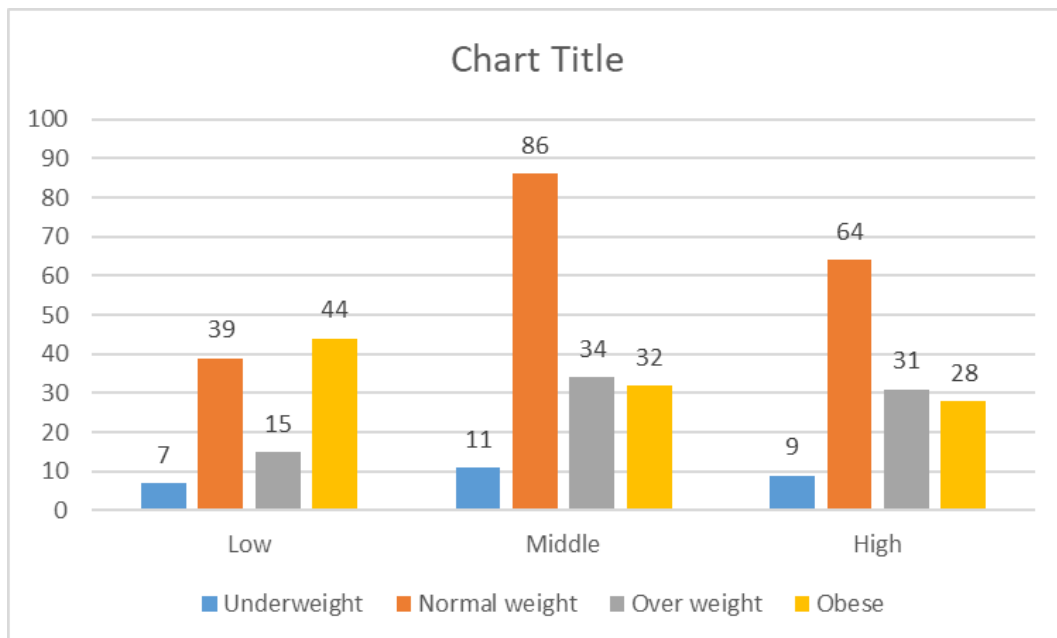


Figure 1. Distribution of weight status of children with their socioeconomic status

Discussion

The trends of overweight/obesity incidences in school children have undergone a remarkable rise over time [17]. As research indicated, obesity can result from several factors, including the adoption of unhealthy dietary patterns, inappropriate lifestyle, physical inactivity, biological factors like alcohol consumption, consumption of some medications, age, gender, and race, and some diseases [18]. Based on the results of the present study, it could be seen that the majority of children who participated in this study had normal weight, 20% of them were overweight, and 26% of them were obese. As shown by Salman et al, the most important factor among primary school children which may be easily controlled by conducting proper educational courses is a physical activity [18]. In addition, based on the results reported by Ismail et al, overweight/obesity prevalence is higher in females than males [19]. As opposed to this result, the results of the present study

revealed that overweight/obesity prevalence was higher among males, which might be because of different factors associated with obesity incidence in the two study samples. However, the findings of this study are in line with those of O'Dea in Australia in 2008 [20] and that of Hajian-Tilaki in Iran in 2011 [21] who found that male children had more prevalence in obesity than the females.

Another factor that was detected to be effective in the obesity situation of the students was the living situation of children's parents. In this regard, obesity was found to be more prevalent among children whose fathers got married more than once and parents were living together. This finding is in line with those reported by Philip and David who demonstrated that in families where parents live together the rate of obesity among children is higher which may be due to their different and richer diet plans [22]. The parents' education level was another factor that affected the obesity situation of children, such that children whose parents had Illiterate or a primary level of education had a higher rate of obesity. These results are in line with those reported by Sherzad who worked on the prevalence of overweight/obesity and associated factors in Erbil, Iraq and demonstrated that there was a significant statistical association between being overweight/obese and low educational level of the children's parents [8].

Investigating the association of parents' employment status and children's obesity situation in different studies has led to different results. For example, the studies conducted by Salman et al [18] and Philip and David [22] showed that the parents' employment status could significantly impact the obesity situation of children. In accordance with the data presented in the present study, it could be seen that the rate of obesity among children whose father was retired was higher. Similarly, among children whose mothers were not employees anywhere, the obesity rate was higher in comparison with others. Some other studies demonstrated various results, for instance, the prevalence of obesity among children whose parents were employed was higher than those with unemployed parents [23]. However, the data presented by Sherzad demonstrated that the obesity rate among children whose parents were unemployed was higher than those with employed parents [8].

In accordance with the results reported by Philip and David, family-based interventions for childhood obesity would be the most efficient intervention for obese children whose parents have severe and complicated obesity. In this regard, they reported that the potential of being overweighed/obese among children whose parents were overweight or moderately obese was found to be higher [22]. In line with this, the results obtained in the present study demonstrated that the highest prevalence of obesity belonged to those children whose mother or father was obese. The majority of the participants in the present study had unemployed mothers, which can be a justification for the fact that the consumption of junk food among the school children of the present study was not high. Anyway, the results of the study demonstrated that there was a highly significant association between the occurrence of obesity and the number of the main meals eaten by the children, and the rate of obesity among children who ate three or more main meals per day was more prevalent. In line with the results of the present study, Abdulrahman reported that students who eat more than 3 meals per day were overweight or obese [23]. Moreover, Morrissey et al demonstrated that working mothers

that can afford junk food for their children may cook fewer meals at home, thus opting for more restaurant meals and fast foods that are densely packed with calories, therefore cause overweight and/or obese among children [24].

Investigations into the effect of physical activities on obesity status should specify certain kinds of influential activities, rather than only examining “light, moderate, or heavy” tendencies in evaluating energy expenditure [25]. Also, different methods need to be examined for a precise calculation of the time spent on different activities. One of these methods can be the direct observation or record of physical activities by the parents, rather than merely asking the children [13]. The data presented in the present study demonstrated that obesity was more prevalent among inactive students compared to active ones, and the rate of active students who were obese was low. Based on the results of the study carried out by Abdulrahman et al, the obesity prevalence among the students in the Kurdistan Region of Iraq is not high in comparison to Western countries. However, due to the changes in lifestyle over recent years, it is vital to devise physical intervention programs within schools and families to improve physical activity and dietary patterns of this age group [26].

Moreover, it should be noted that there is a high association between children’s daily activity and their nutritional status. Therefore, the constant use of physical activity and fitness protocols to monitor these behavioral health outcomes is also needed to guide policies and programs aimed at increasing physical activity and reducing obesity among the school-aged children and adolescents in the Kurdistan Region of Iraq. On the other hand, the obesity rate could be remarkably decreased among children as a result of improvement in the families’ socioeconomic status [1; 27].

Conclusion

This study investigated the prevalence of obesity and physical activity among primary school children in Erbil City/Iraq and demonstrated that the prevalence of obesity was different based on various age groups and among students who had various physical activity patterns. Due to changes in lifestyle, especially over recent years, it is essential to plan and implement intervention programs to improve the lifestyles and dietary patterns of this age range in their families, schools, and communities. Moreover, early interventions on these modifiable risk factors are likely to reduce the rate of childhood obesity. School health programs by concerned stakeholders in promoting the low intake of junk food, active commuting to school, and active lifestyle among children are recommended. Further studies with objective measurements to identify the association between diet- and activity-related behaviors and childhood overweight/obesity among the school children in the Kurdistan Region of Iraq are highly recommended.

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